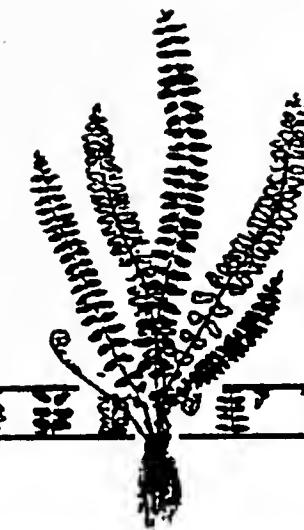


# Hardy Fern Foundation NEWSLETTER

Editor Sue Olsen • VOLUME 7 NUMBER 1 • WINTER 1998



## Presidents' Message:

Jocelyn Horder and Anne Holt, Co-Presidents

Greetings and best wishes for a wonderful fern filled 1998. At this winter time of year many of our hardy ferns offer a welcome evergreen touch to the garden. The varied textures are particularly welcome in bare areas. Meanwhile ferns make wonderful companions to your early spring flowering bulbs and blooming plants. Since we are having (so far) a mild winter continue to control the slugs and snails that are lurking around your ferns and other delicacies.

Don't forget to come to the Northwest Flower and Garden show February 4-8 to enjoy the colors, fragrances and fun of spring. The Hardy Fern Foundation will have a display of ferns in connection with the Rhododendron Species Botanical Garden. Look for booth #6117-9 on the fourth floor of the Convention Center where we will have a display of ferns, list of fern sources, cultural information and as always persons ready to answer your questions. Anyone interested in becoming more involved with the Hardy Fern Foundation will have a chance to sign up for volunteering in the future.

We are happy to welcome the Coastal Botanical Garden in Maine as a new satellite garden. They join 10 other satellite gardens from around the country. These gardens offer the public the opportunity to see hardy ferns in various environments...a wonderful way to learn about including ferns in your own landscape wherever you live. These gardens are constantly testing ferns for hardiness in their areas and help to introduce new ferns to the public. In addition to our new satellite we have also accepted a request from a young garden in Louisville, KY. to be a display garden.

The Foundation has received many different fern spores from Dan Hinkley's expedition to Korea and China. Some of our members are growing these on and we expect to have some new and exciting ferns to introduce to the public. The Foundation also donated \$500. To Steve Hootman for his collecting trip to China and spores from that expedition are now being propagated.

Mark your calendar for the Fern Festival and fern sale May 29-30 at The Center for Urban Horticulture in Seattle. The annual meeting of the Hardy Fern Foundation will take place the evening of Friday May 29 with Don Jacobs, author of a new book on Trilliums speaking on "Woodland Treasures".

If you have not yet done so, please send your e-mail address to Herman & Sue Entz at [Hffmembership@juno.com](mailto:Hffmembership@juno.com) We will be publishing an e-mail address book later this year.

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## Welcome New Members

Susie Egan

Ronald A. Regenhold

Gizelle C. Rayner

Del & Kim Swingle

Alastair C. Wardlaw

## **Polypodium polypodioides**

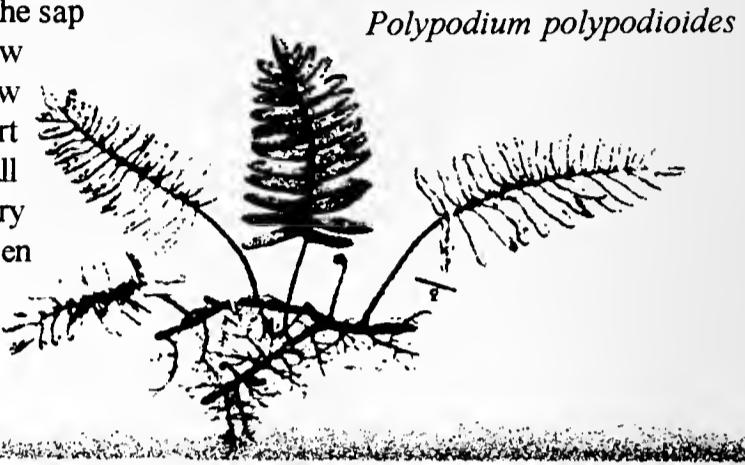
Carl Amason - Calion, Arkansas

The Hardy Fern Foundation recently received a gift of two huge boxes of *Polypodium polypodioides* from Carl Amason of Arkansas. In addition to the plants he sent the following information on cultivating this attractive species:

It always grows on older trees. I saw no sign of it on trees less than fifty years old. I have never seen it on *Pinus taeda* (loblolly pine) or *Pinus echinata* (shortleaf pine). It always grows in a thick growth of mosses and I'm sorry but I do not know mosses or lichens, but I wonder if there isn't some form of symbiosis between the fern and mosses. Perhaps it is only for moisture retention, but anyway, it never grows where there is no green moss or lichens, none of which grows on pine trees here. It will not survive in contact with the soil. I presume drainage is necessary. It will grow on

*Juniperus virginiana*, our common eastern redcedar, but it seems to be only on top of lateral limbs or snuggles on north sides of the tree. It really prospers on pecan trees - trees, limbs - larger ones and not smaller ones - on top, underneath, all around and like wise on *Quercus stellata* (post oak) or if you prefer, the form of post oak called sand hill oak. It will grow if there is moss on large *Liquidambar styraciflua* (sweet gum) trees. In case you are unaware sweet gum was so called because poor people used to tap sweet gum trees for the sap as a type of chewing gum. There is a new generation now that doesn't even know about sweet gum chewing! But, I depart from *Polypodium polypodioides* and all things ferns. Resurrection fern is very common here on rough barked trees - even on *Robinia pseudoacacia*. Always with moss I emphasize again. In dry summer time it is brittle and looks very dead. Some water poured on it and it comes back to life, but it takes high humidity to keep it looking "alive". In rainy weather the ferns here on my

old place are truly magnificent at least to me. I have taken patches and tied them to sides of trees and they slowly take hold with my haphazard manner. In the mountains of Arkansas I have seen it growing - rarely - on mossy rocks. I live on the north edge of Zone 8 (winter hardiness). On the zone maps you will see some fingers of Zone 8 come into Arkansas and I live in one of those fingers. Good luck growing the resurrection fern.



## **Deer Problems**

We have had a number of responses to the inquiry about problems with deer. (Thank you). In Pittsburgh, PA and Monterey, CA they apparently are not a problem - yet! (When one reads that at the turn of the century there were fewer than one million deer in the United States and now there are over 18 million it is a cause for concern.) We were also given information about a product called "Deer Away" which is really supposed to work. For more information call 800-468-2472. We've also heard of a product called "Not Tonight Deer" (don't you love it?) that is also supposed to be effective.

One of the most interesting responses came from Martin Rickard of England who reported that the deer used to roll on his *Dryopteris*, the best ones of course, so he bought £5's worth of lion dung from a local zoo, spread it around the boundary and never saw any more damage. He adds that it did not smell strongly to his nose. We received one comprehensive article which follows.

### **Deer-resistant Ferns**

Bill Plummer - Painted Post, NY

I live in the Southern Tier of New York State in a wooded development that borders "Sullivan Park", the research and development facilities of Corning, Inc. This is an extensive holding on which no hunting is permitted. Up until fifteen years ago, I had no deer "problem". There were deer in the area, but they generally stayed north of my lot. The deer population has continued to increase and they now traverse my lot on a regular basis.

In the winter they will devastate my *Kalmia latifolia* and a number of my rhododendrons unless protected. They do seem to have a regular path through my garden and those plants on their path are more likely to be heavily damaged. The first evidence I noted of browsing on ferns was a number of years ago when a *Dryopteris marginalis* was eaten over the winter. This fern has made a very slow recovery since then. This past winter, 1996-97, a *Dryopteris marginalis* and a *Polystichum acrostichoides* were eaten. Both were later than normal in sending up new fronds, but have made a complete recovery.

In the spring of 1996 and again in 1997 the new fronds of two plants of *Osmunda claytoniana* were eaten. Both sent up additional fronds and both plants are vigorous. Also browsed were a number of interrupted ferns on a bank directly on one of their favorite paths. Some other species have been browsed on, but I cannot recall which ones. The deer have not to my recollection browsed on *Adiantum pedatum* nor on *Thelypteris hexagonoptera* plants which are on their direct path.

It is my observation that, in my garden, ferns are not a favorite food of deer. They will eat the evergreen varieties in the winter when other foods are scarce as well as in the spring before other herbaceous food becomes readily available. Ferns that are later in appearing are much less likely to be browsed on. During the summer, I have observed no browsing on any of my ferns. It is nothing like their marked preference for plants of the liliaceae family - Trilliums, Smilacina, Polygonatum, Disporum. In the spring they have even eaten *Allium tricoccum* (wild garlic, ramps) - one of the first plants to send up new growth.

These observations are tentative and apply only to the local deer population. Deer in other parts of the country may exhibit a liking for ferns. As their population increases and/or we have a severe winter, they may well develop a taste for *Osmunda*, *Dryopteris*, *Athyrium*, *Polystichum* etc. as well as for *Leucothoe*, *Pieris* and more varieties of *Rhododendron* which to date they have avoided. Remember the adage, "The only thing deer won't eat is what they can't reach".

**The Ferns and Allied Plants of New England**  
**Alice Tryon and Robbin Moran**  
**Massachusetts Audubon Society**  
**Lincoln, MA 1997**

"The Ferns and Allied Plants of New England" is a useful guide for ecologists, conservationists, and students of natural history. The central focus of the work is the series of fine habitat photographs of the New England ferns and related plants in their native habitats taken some fifty years ago and only recently discovered." Thus reads a paragraph on the dust jacket of this newly published work. I recently obtained a copy and was immediately impressed with the outstanding caliber of the black and white photographs which illustrate each species. Most of these were taken by naturalist and nature photographer, Robert Coffin between 1934 and 1942 in and around his home area of North Amherst, Massachusetts. It is all the more impressive in this day and age when one reads that he never owned a car, but rather "roamed over pastureland and wooded hills for the better part of his lifetime, recording what amounted to his private world of nature." Many were taken on Mount Toby "with rocky outcrops of limy conglomerate....covered by woodlands providing shaded habitats rich in ferns."

Alice Tryon and Robbin Moran have taken this pictorial core and added the botanical, descriptive, cultural and anecdotal information to turn this into an excellent 325 page guide that will be essential not only to the pteridologically curious visitor to or resident of New England, but to all who are interested in hardy ferns.

The book is well organized and gives information on nearly 100 native species in a refreshingly consistent format. The text opens with a key to the genera. Each genus is then introduced with descriptive material under the following headings - characteristics, distribution, chromosome number, spores and remarks. This is followed with an illustrated key to the species and then by descriptions of the species this time listing characteristics, habitat, New England range, world range, chromosome number, spores and remarks. The remarks contain much pertinent information such as the origin of the name, whether or not the species is endangered and where, old herbal lore, hybrids as well as assorted tidbits of information. Having fought invasions of *Athyrium filix-femina* for years, for example, it was enlightening for me to learn that a mature plant may produce 75 million spores per year and that viable spores have been recovered from soil nearly a meter deep!! (Preservation of the species in extremis!) In addition each species is accompanied by a distribution map showing stations in New England as well as world wide distribution, cultural advice, the fern's author as well as synonymy.

Writing as a horticulturist and not a botanist I'm am very aware of the frustrations that botanical name changes can cause the public. Therefore, I was pleased to see that the authors' kept *Camptosorus* as an independent species and restored the traditional treatment of *Adiantum*. It should be noted, however, that some thirty pages are devoted to photos of scanning electron micrographs of spores which are well presented but primarily of interest to the student of botany.

As far as I'm concerned there is only one weakness in the book and that is the "References for Growing Ferns". The list contains many out of date and/or out of print references. Three excellent contemporary works, John Mickel's *Ferns for American Gardens*, Macmillan, 1994, *Ferns, Wild Things Make a Comeback in the Garden Second edition*, 1995, Brooklyn Botanic Garden Handbook, and Cody's and Britton's *Ferns and fern allies of Canada*, Canadian Government Publishing Center, 1989 are the best resources available and should have been listed. Also the information on the American Fern Society is in error. The membership secretary is Dr. David Lellinger, 326 West St. NW, Vienna, VA 22180-4151 and the Curator of the Spore Exchange is Wayne Baxter, 307 Riverdale Circle, Stephenson, VA 22656. Finally, it would have been nice to have had the Hardy Fern Foundation, P.O. Box 166, Medina, WA 98039-0166 included as a source of information.

Overall, however, this is a fascinating and comprehensive volume with superb illustrations and should be appreciated and enjoyed by everyone with an interest in ferns in general and ferns of New England in particular. I highly recommend it.

Sue Olsen - Bellevue, WA

To order your copy send \$49.95 plus \$3.00 shipping and handling to Educational Resources, Massachusetts Audubon Society, 208 South Great Road, Lincoln, MA 01773.

**Book Notes**

Irving Knobloch - East Lansing, MI 1997

**Book Review Notes:**

"A Guide to Hardy Ferns" by Richard Rush, 1984. Publ. British Pteridological Society, c/o British Natural History Museum, Cromwell Rd., London SW7 5Bd, England. ISBN 0950980609, 70 pgs., - This book is a wonderful source of information with ferns named with genus, species names and authority, habitats, size, and hardiness from *Acrophorus* to *Woodwardia* including some 500 plus hardy ferns.

"The Fern Book" by Mabel Crittenden, 1978. Publ. at Celestial Arts, 231 Adrian Rd., Millbrae, CA. 94030, pp 127, deals with tender, semi-hardy and hardy to very hardy, fewer taxa than the Rush book but has many common names, hints on propagation etc. e.g. *Pellaea rotundifolia* requires good drainage.

"The Cultivation of Ferns" by Andrew MacHugh, 1992. Publ. by Batsford Ltd., 4 Fitzhardinge St., London WIH GAH - said to be available in the USA pp. 144, 10 chapters, 48 color plates. This is the finest European book on the cultivation of ferns that I have seen containing such detailed information on soil Ph preferences, placement for soils and amount of shade needed. There are pages on ferns of temperate Europe, North America and of the tropics, ferns for beds, borders, in bogs, indoor ferns and so forth. I liked the pages on popular ferns and their common names as well as their list of cultivated ferns.



*Pellaea glabella* variety *glabella*.

Photo by Robert Coffin.

"The Ferns & Allied Plants of New England".

## Exploring Private European Gardens Continued

Sue Olsen

When Hardy Fern Foundation member Mr. Dietrich Nittritz learned that we were going to travel to the Czech Republic and Southern Germany he sent me a letter noting that "since we were going to be in the area" we really should see the fern gardens in Northern Germany. To make sure that we would agree he thoughtfully enclosed a map highlighting the towns where these gardens would be found as well as an incredible eleven page computer printout of fern species, hybrids and cultivars on a table showing which gardens had the particular plants. (For the record that included most of them!) So it was that our three week excursion to Europe turned into a six week expedition and our itinerary expanded to include a leisurely trip north. We were not sorry. The fern collections were among the most impressive and certainly the most comprehensive that we've ever seen.

Mr. Nittritz and his wife graciously offered to drive us around to their friends' gardens and we were treated to some extensive touring that was very heady with ferns. We were not only to see ferns that we had never seen before, (*Gymnocarpium fedtschenkoanum*, for example) but many that we had never even heard of before (*Pseudophegopteris levingei*, another example)! Our first destination was just north of Hamburg for the garden of HFF member Mr. Wolfram Gassner. Mr. Gassner bought his dream property in 1995 at which time there was no garden only "boring lawn and shrubs". (See his biography.) In two years he has re-



Garden of Wolfram Gassner. L-R Harry Olsen, Sue Olsen, Wolfram Gassner, Dietrich Nittritz. Photo by Sabine Nittritz.

shaped and transformed 1.6 acres into a budding botanical garden with ferns as the dominant feature surrounded by a collector's smorgasbord of rhododendrons, alpines, perennials and conifers among others. He has imported backbreaking amounts of soil and rocks creating a berm (which is already full of plants) along the edge of the property to reduce traffic noise. In addition he has constructed three major rocky knolls with various types of soil to accommodate his extensive collection of rock garden ferns and plants. As with all of the gardens we visited, I was particularly impressed with the collection of *Aspleniums*. I also found it most educational to compare the species in the comprehensive *Woodsia* and *Cystopteris* collections. Of the more familiar species in the garden, I was amazed to find an *Onychium japonicum* thriving. We have never succeeded with it outdoors here in Bellevue

even with our relatively more temperate climate. The Madeira Island native *Polystichum falcinellum* was downright lusty and most attractive with its once pinnate fronds. Also impressive (very) was his planting of *Lygodium palmatum* which is in a large pot sunk in the ground in order to retain moisture. It is a positive reflection on Mr. Gassner's quite apparent love of his plants. He studiously looks for and tends to the specific needs of



*Asplenium fontanum*. Photo by Sue Olsen.

each of his ferns. They respond with vigor.

The garden contains many North American species and our hosts were amused to watch their American guest photographing American natives (*Cheilanthes lanosa*, for example) in a German gar-

den! There is also a greenhouse for tender plants including some of the more challenging fern species. Here, for example, we admired *Paraceterach reynoldsii* quite content in its specially created niche. All in all we saw over 200 different ferns, far too many to list (some 50 *Dryopteris* alone) during this memorable afternoon and can't wait to see how the garden develops over the years.

In addition to the pleasure of seeing all of these ferns, it was also extremely educational to me to learn about what will survive in their rather severe climate. Here's what Mr. Gassner has to say about their climate. "Let me tell you it is one or even two hardiness zones lower than yours. (Ours is Zone 8.) I find it challenging to try plants which are at the extreme limit of their northern range in the garden and to test how I can prepare the soil, microclimate and shelter to keep them growing on. If I succeed for several years I am able to say: This species is hardy in my garden. Some climate data: Rain about 700mm/annually, days below 0 C 80/ann, winter days normally -10 to -18 C, in extremes down to -27 C, mean temperature in January -2 C, mean temperature in July 18 C, frost days common from November to April, early frosts can occur in the beginning of October, late frosts can occur until the end of May. (Unfortunately for the last 6 or 7 years we have had regular heavy late frosts in the middle of May that destroyed most of the first fern growth.) So the time without frost embraces 4 1/2 to 5 months. We can marginally grow *Rhododendron rex*, *falconeri*, *bureauvii*, *Aucuba japonica*, *Phyllostachys aurea*, *Cedrus deodora* and *Sequoiadendron giganteum*."

## Mr. Gassner Writes:

My parents say I became a plant lover because they put my baby carriage under trees so I could see the leaves moving in the wind.

I cultivated my first cacti at the age of five and raised my first sunflowers from seed in a bed in my grandparent's garden. At the age of eight I wrote a list of several hundred tree species from around the world - all in Latin names that astonished my parents as well as their friends.

At the age of ten my parents moved to Bavaria and in the first spring on a walk through the mountains with my father I saw the emerging fronds of *Blechnum spicant* freshly green in the melting snow. That picture fascinated me. A few days later I discovered *Polystichum aculeatum*, strongly green too, and I decided to transplant them into my bed. The fern enthusiasm had begun.

During the four years in Bavaria my fern collection grew to thirty species, mostly natives of Germany. When my parents moved back to North Germany I took my ferns with me, some of them are still alive.

In the new garden of my parents, I had a bed of about 70 square meters and I began to contact Botanical Gardens and other fern hunters (There were only three others in my area.) When I left secondary school my collections had grown to about 100 species of ferns.

My parent's garden became much too small for my increasing collections and therefore at the age of 24 (I was studying biology in school) I leased an allotment of about 300 square meters. I filled it not only with my ferns but also with a lot of other exotic plants such as bamboos, alpines, hebes, dwarf conifers etc. and quickly other allotment gardeners called my allotment a "Small Botanical Garden."

Since I was a young child I dreamed of owning my own house with a big garden. Therefore, I kept on collecting plants and used the allotment as a nursery for perennials, bulbs and slow growing trees and shrubs. My allotment grew more and more dense and I built up several little rockeries to expand the surface. But nevertheless the allotment threatened to "burst". But I saw no chance to realize my dream because a single home and garden cost about \$500,000 in the surrounds of Hamburg. I was depressed. How could a young man earn enough money for this dream?

A few weeks before my 30<sup>th</sup> birthday a wonder happened: a small advertisement - an old nursery with a large greenhouse, dwelling house, and 6500 square meters of land was for sale. Because the dwelling was highly in need of renovation the offering price was only \$250,000. I had earned my first money as a self-employed worker, my girlfriend (now my wife) had a job for three years and my parents made a rather big gift. All together we had enough to realize the dream I had for a quarter of a century.

When we bought the old nursery (it was given up a few years before) there was only a boring lawn with a few shrubs around the house and over 5,000 square meters of neglected meadow. What a task! Since autumn 1995, when we bought the old nursery, I worked nearly everyday from morning to evening. I only took time to eat, drink, sleep and work! For example, I only watched TV perhaps ten times during the last two years.

We have had a great deal of help from my father. We had to dig up the house to install drainage, rework the west facing wall and build 500 meters of fencing partly 80 cm deep into the soil to protect against ground mouses and other things.

I bought 50 tons of rocks and nearly 1,000 tons of soil to form a dam against the street noise and to model the future garden and rockery. Most of this work was done in '96. This year ('97) I built up my rockery (35 tons of stones, all moved by hand) and transplanted most of my plants from the allotment and my parents' garden (I moved some plants in '96) to their final home. I dug up and planted thousands of alpines, perennials, bamboos, bulbs, shrubs and trees and strained my right arm for a time, but I am happy! And at present nearly all of my plants are transplanted. One and a half years ago in a chaos of destroyed lawn and heaps of soil, I would not have believed that the garden could develop so fast to the present picture.

I am interested in all kinds of plants. I cultivate trees (especially conifers, maples, oaks and birches), shrubs (especially rhododendrons), bamboos, grasses, ericaceae, saxifragas and other alpines, bog and desert plants, different perennials and bulbs. But the main plants still are the ferns and fern allies. And I believe a percentage of 10 (over 200 species of ferns) is enough to call our garden a "fern garden". They are present in every corner.

Wolfram Gassner, November 1997

## A Few Notes from the Editor

Sue Olsen

We have been publishing garden evaluations with the plants rated on a scale of 0 - 5. I've been reminded that I neglected to note which end is up. The rating of 5 is a top rank, 0 the least.

Our spring newsletter will be a "special issue" on propagation. We've had an excellent response from our readers, but still have room for your contribution. I can convert manuscripts from e-mail and my address is [Foliageg@juno.com](mailto:Foliageg@juno.com).

The American Horticultural Society has published a heat map (something of a companion to the USDA Winter Cold Zone Map). I'm waiting for permission from them to publish the information in their AHS Resource Bulletin and hope to include this in our summer newsletter. The full color map measures 24" x 36" and is available for \$14.95 postpaid from AHS Heat Map, 7931 East Boulevard Drive, Alexandria, VA 22308.

The HFF is looking for volunteers to help with grooming ferns, evaluations, record keeping, etc. in the greater Seattle-Tacoma area. To join us, please call Michelle Bundy at 253-838-4646. Fern knowledge is not necessary.

Finally, Martha Stewart has come out with a line of table linens with a fern motif. They are available at Kmart stores.



### The Hardy Fern Foundation NEWSLETTER

*The Hardy Fern Foundation Newsletter* is published quarterly by the Hardy Fern Foundation, P.O. Box 166, Medina, WA 98039-0166.

Articles, photos, fern and gardening questions, letters to the editor, and other contributions are welcomed!

Please send your submissions to  
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#### Newsletter:

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# Fern Gardens of the Past and a Garden in Progress

Catharine W. Guiles - New Gloucester, ME

Recently a friend was cleaning out an old family home in Newburyport, MA and came upon evidence that one of its occupants, Judith Hopkins Coffin, had been interested in ferns. There were five copies of the *American Fern Journal* dated 1918 and 1919; two pamphlets dated 1898 and 1900, of papers presented at meetings held by the Linnaean Fern Chapter; a catalog from Gillett's Hardy Fern and Flower Farm, in Southwick, MA (*Camptosorus rhizophyllus* and *Lygodium palmatum* plants, 15 cents and 25 cents, respectively); and several old fern guides. Two of the authors of these guides, Willard Nelson Clute and Lucien Marcus Underwood, are permanently affixed in the identifying terminology of some American ferns.

A list of the members as of March 1918 of the American Fern Society indicated that Mrs. Coffin had been a member since 1896. In addition to members whose names still surface in the literature, the society also listed someone with a most memorable surname, Prince Roland Bonaparte, of Paris, who had joined in 1911. As I learned from a discussion of his work in one of the copies of the *American Fern Journal* (1), plus some other superficial research, he was a grand-nephew of the Emperor and a prominent natural historian, anthropologist, and polymath of his day.

My friend kindly sent me this treasure trove, and a whole article could be written on what our forebears in the faith were up to in the decades around the turn of the century. My attention, however, was particularly attracted to reports on fern gardens.

In the Vol. 8, No 2 (1918) issue of the *American Fern Journal*, Harold Goddard Rugg (q.v. *Osmunda x ruggii* Tryon) reported on his fern garden in Proctorsville, Vermont (2). Now I don't feel so badly that my *Asplenium trichomanes* failed, because Rugg also had trouble growing the calcium-loving species. He had success with *Camptosorus rhizophyllus* but ultimately failed with *Asplenium viride*, *Asplenium ruta-muraria*, *Woodsia glabella*, *Woodsia alpina*, and *Pellaea atropurpurea*. Interestingly, the Japanese painted fern (*Athyrium niponicum* 'Pictum')

had already been imported into this country and thrived for him, as did *Lygodium palmatum* which he collected from the wild. He also grew "varieties of the Lady fern which may be purchased in England."

In Vol. 8, No. 3, Edward W. Graves reported on his fern gardens, the first in Kansas and the second in Long Island, Alabama, in the northeastern corner of that state (3) He notes that his Kansas ferns--among them *Cystopteris fragilis*, *Athyrium filix-femina*, *Onoclea sensibilis*, *Cheilanthes lanosa*, *Pteridium aquilinum* and *Dryopteris filix-mas*--were included in the family's move. In Alabama, he expanded his collection and the size of his fern garden greatly, installing an irrigation system and enclosing "the fernery with a rock wall 3 ft. high for protection and to conserve moisture." By 1915, he had 60 species from several states. "But all did not grow." He attributes some of his failures to overly radical changes of climate. He tried six ferns from California, but only *Polystichum munitum* and *Woodwardia radicans* succeeded. Alabama, he concluded was too far south for *Polystichum lonchitis*, as it was for *P. Braunii*. Then came a cold winter, 1916-1917, "and most of the *A. capillus-veneris* froze out." There were certainly successes, and temporary successes--species that grew for a few years before disappearing--and he concludes, "I derive much pleasure from my fern garden as I have many ferns growing near at hand for study, that otherwise I would have to go several miles to see."

As Prince Roland would have said, "Plus ça change, plus c'est la même chose." I, too, derive pleasure from a fern garden, and feel that I am only following in the paths of the two authors above and wonder if I am reinventing the wheel. Like Graves, I have transferred a garden, though only a distance of 130 miles within the state of Maine. It was formerly in the coastal town of Blue Hill, near Acadia National Park, and is now inland, at New Gloucester, near the twin cities of Auburn and Lewiston (4).

Though short in distance, the two locations have different climates and soil conditions. The weather at the Blue Hill location is influenced by the sea, and the soil is thin and highly acidic. Any gardening there beyond use of native or very tough plants requires much work on the soil. There are greater extremes of climate in

New Gloucester--winter brings winds called the "Montreal Express"--yet the many apple orchards and well-stocked vegetable stands in the region in summer testify to its excellent soil. When I established the New Gloucester garden, which, like the Blue Hill garden, is only a test garden, I had high hopes that the limitations of the Blue Hill location might be eliminated. Indeed, when *Dryopteris erythrosora*, a fern I had always advised others in Maine to avoid, survived the very cold winter of 1995-96, I thought it was time to eat crow (5). However, this fern did not survive the following winter, which was characterized by unremitting freezes and thaws. The same pattern of survival for the first year followed by failure in the second applies to *Asplenium trichomanes* and *Woodwardia virginica*.

And then, after a cold spring, came the very hot, dry summer of 1997, a summer during which I was frequently out of town for a week or more at a time. During one particularly hot spell when I was away, eight species or forms were severely affected by the drought, and only one, *Athyrium thelypteroides*, has not regrown any fronds. Thick mulching with cocoa hulls and watering before an absence is obviously not enough; like Mr. Graves, I need an irrigation system.

Interestingly, I have noticed that some ferns have a spurt of growth in late summer, when temperatures are cooler and rain more regular. In 1995, I planted a *Dryopteris filix-mas* 'Linearis Polydactyla'. In 1996, after the very cold winter it put up three-inch fronds; in the spring of 1997, it grew only one pinna, and I thought there was no point in hoping for anything more. Then, in late August it presented me with a couple of 11-in. fronds and a third smaller one! I noted that, when I tried to grow *Polystichum munitum* in Blue Hill, the plants would do the same thing--put up healthy fronds in the late summer. Unfortunately, these plants never lasted for more than two years.

Readers who peruse the chart accompanying this article may wonder why the most common local ferns, the Interrupted, Hay-scented, Spinulose, Bracken and New York ferns, are not in the garden. My goal at present, is to plant primarily species that may be rare in or not native to this area. The above-mentioned plants, as well as New England's common fern allies, grace the lanes and woods nearby, where they are doing just fine.

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**Catharine W. Guiles** received an A.B. from Radcliff College, with a major in French Literature, and an M.L.S. from the University of Maryland. She became interested in ferns through study of the species growing on a family property in Blue Hill, Maine. She has enjoyed furthering her knowledge through reading and membership in several fern societies; through field trips and attendance at the Pteridophyte '95 conference at Kew, England; through gardening; and most recently, through the Internet. Prior to moving to Maine, she worked as a science editor in New Haven, CT and was on the staffs of *American Scientist* and *Economic Geology*.

Species or form	Date planted	Overall size (in.)	Spores	Overall size (in.)		Spores	Garden worthiness
				July '96	'96	summer '97	
<i>Adiantum pedatum</i>	1994(?)	12	yes		10 (affected by drought)	yes	5
<i>Arachnioides standishii</i>	spring '97	-	-		4.5	no	-
<i>Asplenium trichomanes</i>	fall '95	4	yes		died	-	5
<i>Athyrium filix-femina</i>	on property	28.5	yes		25	yes	4
<i>Athyrium filix-femina</i> --a crested form	fall '95	8.5	no		8	no	2
<i>Athyrium thelypteroides</i>	1996	-		Died or dormant as a result of drought		-	-
<i>Athyrium niponicum</i> 'Pictum'	fall '95	20	yes		13 (post-drought)	yes	5
<i>Cystopteris bulbifera</i>	1994	17	yes		18	yes	5
<i>Dryopteris celsa</i>	1994	-	-		15	no	3
<i>Dryopteris cristata</i>	1994	18	yes		12 (affected by drought)	yes	4
<i>Dryopteris erythrosora</i>	fall '95	4.5	no		died	-	-
<i>Dryopteris affinis</i> 'Stableri crisped'	spring '97	-	-		8	no	-
<i>Dryopteris filix-mas</i> 'Undulata Robusta' (a)	1994	18	yes		22	yes	5
<i>Dryopteris filix-mas</i> 'Linearis Polydactyla'	fall '95	3	no		11 (put up full fronds in Aug.)	no	3
<i>Dryopteris filix-mas</i> 'Linearis congesta'	spring '97	-	-		10	no	-
<i>Dryopteris remota</i>	fall 1997	-	-			-	-
<i>Dryopteris goldiana</i>	1994	27	yes		25 (affected by drought)	yes	5
<i>Dryopteris marginalis</i>	spring '96	19	yes		23	yes	5
<i>Gymnocarpium dryopteris</i>	1994	6	no		3 (affected by drought)	yes	4
<i>Matteuccia struthiopteris</i>	1994	33	no		34	yes	5
<i>Osmunda cinnamomea</i>	(1) fall '95 and	4	no		died	-	-
"	(2) spring '96	9	no		10	no	normally, 5
<i>Osmunda regalis</i>	1997	-	-		16 (affected by drought)	yes	4
<i>Osmunda regalis</i> var. <i>regalis</i> 'Purpurascens' (a)	1997	-	-		17	yes	5
<i>Polypodium virginianum</i>	1996	-	-		5	no	2
<i>Polystichum braunii</i>	1996	-	-		19	yes	-
<i>Polystichum acrostichoides</i>	1995	25.5	yes		30	yes	5
<i>Thelypteris decurvis-pinnata</i>	fall 1997	-	-			-	-
<i>Thelypteris phegopteris</i>	spring '96	12	yes		Became dormant after drought	yes	2
<i>Woodsia ilvensis</i>	1994	4.5	?		3.5 (affected by drought)	yes	3
<i>Woodwardia virginica</i>	1994	9	no		died	-	-
Unknown fern, probably a <i>Dryopteris</i> species	spring '97	-	-		12	no	-

Garden worthiness: 1 = low; 5 = high. Ferns planted in 1997 not rated.

a = doubt about identification

# Fern Finding in the Hocking Hills

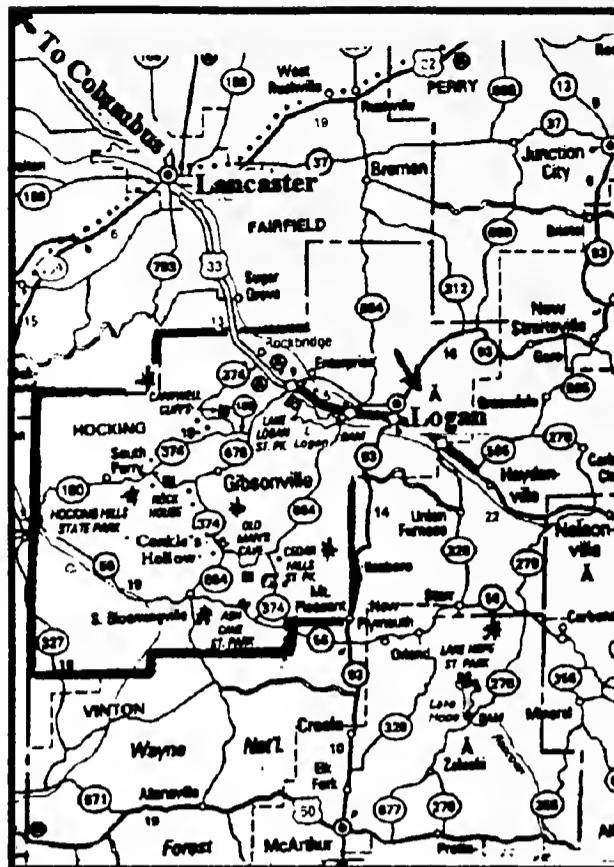
Joan Eiger Gottlieb  
and Warren H. Wagner, Jr.

Southeast of Columbus, Ohio lies an unglaciated area known as the **Hocking Hills**. Here, among impressive cliffs, gorges, grottos and "caves," one can find an array of unusual ferns, fern allies, and two species of Appalachian gametophytes. The sandstone bedrock of this area was laid down 350 million years ago as sedimentary layers in a warm, shallow sea. Subsequent uplifting, erosion, and weathering have shaped geological formations of great beauty and diversity.

Human history here goes back at least to the close of the last Ice Age when nomadic paleo-Indian hunters passed through the area. Mound-building Adena-culture tribes inhabited the Hocking Hills from about 1 A.D. to 800 A.D., followed by Fort Ancient Indians who used the rock recesses as shelter from the 1300's to the 1600's. Wyandot and other tribes living here in the mid-1700's named the nearby river "Hockhocking" or "bottle river," an apt description of its glacial valley. In the early 1800's pioneers farmed the valley and built grist and powder mills, charcoal iron furnaces and a canal along the river and its tributaries. Coal and timber resources were exploited until the late 19<sup>th</sup> Century and game animals including deer, elk, wild turkey, bear and wood bison were taken by hunters.

In 1924 Ohio started purchasing the six parcels of land totaling 2,000 acres that are now **Hocking Hills State Park**. These are surrounded by over 9,200 acres of Hocking State Forest land, making a good-sized reserve. During the Great Depression WPA workers reforested the land, constructed trails, bridges, roads and tunnels, and carved remarkable steps into the natural stone to make the area accessible to visitors. No collecting is allowed without permission from the authorities.

In 1987 Drs. Warren (Herb) Wagner, Charles Werth, and James Hickey led a field trip to the Hocking Hills for fern enthusiasts attending the AIBS meeting at Ohio State University. A repeat visit in 1997, at a more leisurely pace, revealed the area to be even nicer than remembered; and, best of all, the ferns found a decade ago are still thriving.



that is quite typical of all parts of the Hocking Hills. The harder, more resistant zones form the roof and floor. The cave is reputed to have served once as temporary lodging for robbers, horse thieves and bootleggers and as earlier shelter for Native Americans whose baking ovens and water troughs are still in evidence.

The trail from the parking lot that leads to the cave passes a remarkable cliff that has *Narrow beech fern* (*Phegopteris connectilis*) and Bulblet bladder fern (*Cystopteris bulbifera*), along with *Asplenium pinnatifidum* at eye level and about half a dozen of what are possibly Scott's spleenwort (*Asplenium ebenoides*) on an overhead rock shelf, well above reach. *A. ebenoides* is the sterile diploid of the Ebony spleenwort (*A. platyneuron*) and the Walking Fern (*A. rhizophyllum*), both of which occur in the Hocking Hills area and create this beautiful hybrid occasionally. (A fertile allotrap-

Scott's spleenwort  
*Asplenium ebenoides*  
(*A. platyneuron x*  
*rhizophyllum*)

loid population of *A. ebenoides* is known from only one site in Alabama.)

Exiting Rock House and continuing south on S.R. 374, a side road to **Horseman's Camp** in the State Forest is worth exploring. Here, in rich, mixed hardwood forest, there is Glade fern, Silvery glade fern, Southern lady fern and Ebony spleenwort (all noted at Cantwell Cliffs) and Southern bladder fern (*Cystopteris protrusa*). In 1987, on a large boulder in these woods, Dr. Wagner identified a plant of the Tennessee bladder fern (*Cystopteris tennesseensis*) – the fertile allotetraploid hybrid of *C. bulbifera* x *C. protrusa*. This beautiful hybrid has lime-green foliage, the pinna shape of its *C. protrusa* parent and the frond attenuation, scaly bulblets and epipetric (rock-perching) habit of *C. bulbifera*. Incidentally, the Tennessee bladder fern grows easily from bulblets in humusy soil and makes a lovely and hardy garden plant.

On the 1987 trip the group visited private land in this area to see *Dryopteris goldiana*, *D. marginalis* and their sterile hybrid *D. Xneowherryi* all growing together on a woodland

hillside. The striking hybrid has leaf morphology and size intermediate between its two parents (it looks like a robust Marginal wood fern) and sori located almost exactly half way between main vein (as in *D. goldiana*) and pinna margin (as in *D. marginalis*.)

A rare, non-fern beauty found here was Three birds orchid (also called Nodding Pogonia) – *Triphora trianthophora*. It had white flowers, three to a shoot (true to its name,) and small, egg-shaped leaves clasping the stems – an eight-inch high charmer.

Only a few miles south on S.R. 374, on Big Pine Road, lies **Conkle's Hollow**, a deep, rugged gorge with 240' cliffs and more of the Appalachian shoestring fern gametophytes on moist, north-facing cliffs. Flashbulb photography and a macro-lens are needed for habitat shots of these minuscule ribbon-plants. Distinguishing them from the abundant mosses and liverworts takes a patient, trained eye and a good hand lens. At the north end of the gorge a waterfall drops into a large pool surrounded by a U-shaped rock overhang where some young clumps of *Huperzia porophila* grow on the sandstone. This distinctive fir-moss (an Appalachian endemic) is dark-green, skinny, with widely spreading, toothless leaves of pretty uniform length along the upright shoots. Narrow, elongated gemmae are abundant near the tips. On the way out of the gorge significant populations of this little plant stood out on the cliffs and on flat ledges and rock shelves, somehow missed when we were walking in the north direction. A vigorous hybrid (*H. Xbartleyi*) between *H. lucidula* and *H. porophila* also occurs in Ohio and competes for the same sandstone habitats that support *H. porophila*. The hybrids are best distinguished by the presence of aborted spores (misshapen, shriveled or empty-looking.) Some years ago "Dutch" Huttleson discovered the Southern adder's-tongue (*Ophioglossum vulgatum*) growing in a low, shaded, forested flat area near a stream in Conkle's Hollow.

Off Rt. 33, along County Road 116, the Hocking Valley has some outstanding examples of so-called honeycomb sandstone. The hollows and projections formed by dissolution of softly cemented rock are home to nearly all the rare pteridophytes found in the Hocking Hills. In addition, on a high cliff here, there is the Resurrection fern (*Pleopeltis polypodioides* var.

*michauiiana*) at its northernmost station in the United States. Its fronds are only half the size of Rock polypody (*Polypodium virginianum*), coiling tightly in dry periods to reveal the dense, gray, peltate scales on their lower (abaxial) sides. Deep crevices of the honeycomb sandstone shelter small mats of the bright green, branching filaments of another Appalachian gametophyte - *Trichomanes intricatum*. Persisting here since the last ice age, these independent gametophytes bear no sporophytes and reproduce by tiny, detachable gemmae composed of short filaments. In contrast with the ribbon-shaped thalli of *Vittaria* (seen at Cantwell Cliffs and Conkle's Hollow,) the *Trichomanes* gametophytes are filamentous and look furry or felt-like en masse.

Do not leave the Hocking Hills without visiting the two areas that lie south of Old Man's Cave on S.R. 374. **Cedar Falls** contains the best waterfall in the region and its cool, damp gorge is lined with Hemlock, Canada yew, Yellow and Black birch. Nice populations of Mountain spleenwort (*Asplenium montanum*) hug the vertical walls of hard sandstone near the falls.

**Ash Cave**, at the southernmost end of Hocking Hills State Park, has the largest and most spectacular recess "cave" in Ohio. Handicapped accessible on a half-mile paved trail, this massive, horseshoe-shaped overhang, dripping with water, lies at the end of a narrow gorge. It is worth going uphill to the right of the "cave" to take the west rim trail back to the parking/picnic area. As in other gorges in the park, walking the rim offers a different experience, visually and botanically. A mixed forest of maples, Beech, Sassafras, Cucumber magnolia, Yellow buckeye, and other species can be enjoyed on one side, while austere, acidic, dry barrens with Creeping arbutus, Teaberry, Mountain laurel, Scrub oak and Pitch pine are characteristic of the opposite side, and northern species like Hemlock grow in the deep gorge below. Thus, the flora in these hills has been shaped by prevailing exposure and microclimate, and by past Pleistocene ice movement.

Zaleski State Forest south of Ash Cave has fine examples of southern Ohio's woodland species, and Irish Ridge Road in Lake Hope State Park has a small roadside population of

*continued on page 10*

## Fern Finding in the Hocking Hills continued from page 9

American climbing fern (*Lygodium palmatum*.) In 1997 this remarkable fern was reduced to a few remnant fronds, obviously suffering the effects of the summer drought. Both these areas are worth short detours to explore. The take-home lesson from our message is: don't miss the Hocking Hills – Ohio's premier area for history, scenery and pteridology!

## Postscript

(Your editor was curious about the "gametophyte ferns" and requested more information. Here is Dr. Gottlieb's response.)

"Appalachian gametophytes" are widely distributed in the central mountains of the eastern United States. There is a station for *Trichomanes* only an hour from Pittsburgh in Ohiopyle State Park on Pennsylvanian-age Pottsville sandstone along the Youghiogheny River (better known to non-botanists for whitewater rafting and two Frank Lloyd Wright houses - Fallingwater and Kentuck Knob.)

Colonies of these Pleistocene relict plants grow in deep, dark recesses of acidic rocks from Vermont to Georgia, along the Appalachian spine of the region. The porous sandstone that is their favorite home may act like a sponge, holding water when it rains and releasing it slowly to the crevice-hugging gametophytes by capillarity or wicking.

The tiny plants look more like algae or young mosses and it takes a practiced eye or good hand lens to distinguish them. They are less than a millimeter wide and of variable length, but much intertwined and branched. Reproduction is by tiny, distinctive gemmae and branch breakup. Abortive, apogamous (non-sexual) sporophytes of *Vittaria* have been found occasionally in Ohio, but it appears that these puzzling little plants live and survive at their northernmost limits entirely in the gametophyte phase, the sporophytes having been extirpated by ice-age cold. Don Farrar and others have published extensively on the "Appalachian gametophytes," most recently in the *American Fern Journal*, April - June 1992.

## BLECHNUM PENNA-MARINA Little Hard Fern

James R. Horrocks -  
Salt Lake City

The genus *Blechnum* first appears in the fossil record in Eocene deposits and is known in younger sediments to the present. The name *Blechnum* originates from the Greek name for a fern, "Blechnon". The species

name "penna-marina" means "feather of the sea". Known as Little Hard Fern, it is geographically an antarctic alpine, being native to Australia, Tasmania, New Zealand, and southern South America. In New Zealand it is widespread particularly in mountainous regions in open scree areas, grasslands and the margins of forests. This species is quite cold hardy. It is of the creeping sort, festooning the ground with its small once-pinnate fronds. Its spreading nature sets it apart from the familiar Deer Fern, *B. spicant*, which is much larger. In New Zealand, *Blechnum penna-marina* may possibly be confused with another small once-pinnate species, *B. membranaceum*, which occurs along streambanks. One subspecies 'Alpina' is known from South America which sports somewhat larger fronds with more crowded pinnae and with shorter stipes on the fertile fronds. There is a crested form of *B. penna-marina* called 'Cristatum' in which the frond apex is neatly crested and there is also a dwarf form with fronds two to four inches long.

**Description:** The rhizome is slender and creeping, branching alternately and at times erratically, mainly at the soil surface, rooting below. The pinnate fronds are produced alternately along the back of the rhizome, the younger portions often reddish becoming darker at maturity. The sterile fronds are evergreen and leathery, four to eight inches in length, and may lie horizontally or semi-erect. The stipe is about 1/4 the length of the frond. The pinnae are quite close-set, like the teeth of a comb, and are linear-oblong, with a slight curve toward the tip of the frond. Being noticeably dimorphic, the fertile fronds can be twice the length of the sterile ones and are held stiffly upright with narrowly linear pinnae. Sori are produced on nearly every fertile pinnae and completely cover the undersurface of the fronds. The indusia is linear.

**Culture:** This is a delightful little fern, ideal as a ground cover in a moist shaded or sunny garden, particularly effective and striking around rocks. It enjoys a friable soil enriched with leafmold but will also grow well in gritty soils as long as there is ample humus content. This species can spread rapidly in a suitable situation and with enough moisture in a humid climate. It can take considerable exposure to sun. Being a true alpine, it is quite cold hardy. Reginald Kaye notes that it is hardy in all parts of Britain and therefore, should be tried in other locales. It can be quite adaptable and is worth trying in a protected garden area.

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*Blechnum penna-marina* in its native habitat in New Zealand.  
Photo by Sue Olsen.

# The 1997 HFF Spore Exchange

**To Order:** Please print your selections clearly in **alphabetical** order (not by number, please) order using the genus, species, and cultivar. Include 25 cents for each fern requested (check payable to the Hardy Fern Foundation) and a **self-addressed stamped envelope**. No charge for overseas members, but please enclose an international postal coupon (2 for larger orders) and an envelope. **Maximum order 25 per year.** Mail requests to:

Wayne "Bubba" Baxter / 307 Riverdale Cir. / Stephenson, Va. 22656 / USA / Email fernbubb@visuallink.com

The descriptive columns are **Pk** packets available, **Z** the coldest zone this fern has been reported to have grown in, **SZE** in inches, **GRO**th habits listed below, **Coll.Site** if collected in the wild, **Orig** their natural range, **Donor** Listed by the most recent year the spore was donated followed by the donors number.

1	Rare fern	N	Moist soil	B	Tree fern
2	New Fern	S	Shade	G	Spdg habit
3	Few spores	T	Part Sun	K	Terrestrial
\$	GreenSpore	U	Bright Sun	F	Aquatic
\$\$\$	GreenSpore with Donor	H	High Humidity	V	Deciduous
A	Alkaline	L	Soil Specific	O	Evergreen
Z	Acid soil	R	Rocky Soil	Y	Dimorphic
D	Dry Soil	C	Climber	E	Easy 2 grow
W	Wet soil	J	Epiphytic	Q	Hard 2 grow

## Hff Spore Exchange Addendum

Here they are the last spores that will be listed for the year 1997. So get going fast because there will be **no requests accepted after April 30, 1998**. The only exception will be if the request is accompanied by a spore donation or if you are an overseas member (due to the different growing seasons).

Well, my plea for more spores was heard by 7 members. Conor Layng, John Mello, Joyce Descloux, Sue & Herman Entz, and three super stars Iris Gaddis, Roger Hughes, Wolfram Gassner. Many Thanks from the rest of us.

HFF	GENUS	SPECIES	CVR	PK	SZE	GRO	COLL.SITE	ORIG
1	Adiantum	monochlamys		2	6	16	EZNSNH	Easia
2	Adiantum	Pedatum	Subpumilum	5	3		1NSZ	US
3	Adiantum	venustum		4	5	18	EGKNSZ	TibetIndCh
4	Arachniodes	miqueliana		1	5	24	GK	Easia
5	Asplenium	bulbiferum		2	6	36	NJZHES	AusNZ
6	Asplenium	ceterach		1	6	8	DKANT	Eur,india,Af
7	Asplenium	dimorphum		1	8	30	NKZS	Norfolk is
8	Asplenium	Majoricum		2	5			
9	Asplenium	oblongifolium	Crested Beauty	2	7	30	2ZTGOE	Nz
10	Asplenium	rhizophyllum		5	4	6	ANTKO	NAm
11	Asplenium	scolopendrium	cristatum	5	6	12	2ANSKO	N Hem
12	Asplenium	trichomanes	Incisum Molle	6	2	9	2ANTE	Eur
13	Asplenium	trichomanes	Incisum Moule	6	2	9	2ANTE	Eur
14	Athyrium	filix-femina	cvr?	5	3	48	2ZNTKE	N. HEM
15	Athyrium	filix-femina	Plumosum Penny	2	3	36	2ZNTKO	N. HEM
16	Athyrium	niponicum	Metallicum cristato-flabellatum	1	4	18	EZNTV	Easia
17	Bommeria	hispida		5	7	7	DURK	ArizTexMex
18	Botrychium	Lunariaoides		2	5	12	2TQKNM	NAm.
19	Cheilanthes	Parvifolia		4	8	10	21DURA	SwUSAMex
20	Cyathea	Vielardii		2	8		2BENTK	NewCaled
21	Cyrtomium	carvotideum	x C. falcatum	5	6	16	OKW	S&EasiaHawaii
22	Cystopteris	bulbifera		5	3	28	EANTVK	N.A.
23	Dryopteris	affinis x wallichiana ?		6	5			
24	Dryopteris	Clintoniana x Intermedia		15	3	48	2TNVKE	N Am
25	Dryopteris	decipiens		4	5	19	EKNTR	RyukChJp
26	Dryopteris	filix-mas	Cristata variegata	60	3	48	2ZSNVE	N Hem
27	Dryopteris	filix-mas x affinis	undulata robusta	14	3	48	2ZSNVE	N Hem
28	Dryopteris	intermedia	Robusta?	10	3	34	2ZSNOE	E N America.
29	Dryopteris	iuxtaposita		1	7			India
30	Dryopteris	nipponensis		3	6	24	NSKE	ChJp
31	Dryopteris	pseudo-filix mas		5	5	46	NSKE	MexCalif
32	Dryopteris	Sacrosancta		5	6		K	
33	Dryopteris	tokyoensis		5	5	30	EZSRN	Jp,Kor
34	Dryopteris	x Dowellii		5	5	60	2	
35	Lycopodium	tristachyum		3	3	6	QLTNZK	NHem
36	Polypodium	virginianum		3	2	14	RDTON	N.Am
37	Polystichum	Adiantiform		2	5			
38	Polystichum	mohriodes	Elegans	3	5	12	R	Ch,W N.Am
39	Polystichum	setiferum		99	5	40	TNKE	China
40	Polystichum	setiferum	Congestum Cristatum	15	5	40	2TNK	Europe
41	Polystichum	Stenophyllum		2	5			
42	Polystichum	taqawanum		1	4	24	EKNOT	Jap
43	Polystichum	vestitum		5	6	36	TSKE	AusNZ
44	Pyrrosia	varia		2	8	5	UD	E Indies
45	Selaginella	Uncinata		2	8	2	2OQTKN	
46	Woodsia	ilvensis		4	2	6	ERTNZ	EasiaNAmEur
47	Woodsia	polystichoides		2	4	10	RUZENO	EAsia
48	Woodsia	polystichoides	SilveryFuzzy	8	4	10	2RUZEN	EAsia
49	Woodwardia	orientalis		2	8	60	TEWU	E&S asia

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